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(54) Self-regulating ventilation grille

Selbstregelnder Lüftungsrost

Grille de ventilation à réglage automatique

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Description

The present invention relates to a self-regulating ventilation grille, comprising a housing having a top wall, a bottom wall, two end panels, a first longitudinal side with an inlet, and opposite the first longitudinal side a second longitudinal side with an outlet, an essentially plate-shaped valve being provided in the housing and extending between the end panels, for the purpose of regulating a passage opening for the ventilation of air from the inlet to the outlet, which valve at its end nearest the longitudinal side with the outlet is provided with a counterweight and rests on a rolling part curved towards the valve, along which rolling part the valve rolls during the regulation of the passage opening.

Such a self-regulating ventilation grille is known from EP-A-0,503,722 (corresponding to NL-A-91,00392). In the case of the self-regulating ventilation grille according to this EP-A-0,503,722 a complex system of locking wires prevents the valve from sliding downwards along the rolling face. These locking wires according to EP-A-0,503,722 are disposed in such a way that they do not impede the valve in its movement, because the locking wires do not undergo any length change. In order to prevent the locking wires from impeding the valve in its movement, these locking wires must be infinitely soft, so that they can easily assume any shape during the movement of the valve. However, due to the fact that the locking wires are infinitely soft, they are also susceptible to stretching, which makes regular adjustment necessary. This adjustment can be achieved by means of tensioning screws to which the locking wires are fastened. The locking wires can be tightened by means of said tensioning screws, with the result that any play between the valve and the rolling part is eliminated.

The disadvantage of fastening by means of locking wires, as described in EP-A-0,503,722, is that when the locking wires are being fitted great accuracy is required for the fitting and tensioning, and that this fitting is tricky to perform, and is time-consuming. Moreover, the locking wires have to be re-tensioned from time to time, in order to ensure good operation of the valve.

The object of the present invention is to provide a self-regulating ventilation grille of the abovementioned type which does not have these disadvantages, and in which downward sliding of the valve over the rolling part is prevented and rolling of the valve along the rolling part is impeded as little as possible, so that the response sensitivity of the valve is as high as possible.

This object is achieved according to the invention through the fact that the valve and the rolling face are each provided with a tooth system, which are disposed in such a way that said tooth systems mesh with each other during rolling of the valve over the rolling face. The running part of the valve in this case has a running face and a valve tooth system, and the rolling part has a rolling face and a rolling tooth system. Due to the fact that while the running face is rolling over the rolling face the rolling tooth system and valve tooth system mesh with each other, sliding of the valve along the rolling part is prevented. Due to the fact that the valve is supported essentially by means of the running face on the rolling face of a support, the friction, which is detrimental to the unimpeded movement of the valve and which is caused by the meshing of the tooth systems, is greatly reduced.

It is advantageous according to the invention if the valve tooth system and rolling tooth system are formed and disposed in such a way that the teeth of one tooth system mesh with some play in the tooth spaces of the other tooth system. Some play in this case should be understood as such play that the teeth of the respective tooth systems do not mesh in a tight fit, and a tooth meshing in a tooth space thus makes contact with another tooth essentially along one tooth flank. The heads of the teeth of one tooth system in this case preferably make no contact with the bottom of the tooth spaces of the other tooth system. Such tooth systems have the advantage that they only prevent sliding of the running face along the rolling face and otherwise have no essential supporting function, with the result that the friction can be low. A non-tight-fitting, low-friction meshing of the tooth systems is possible, for example, through the fact that the valve is supported on the rolling face of a support by means of its running face. Were the valve to be supported by the support by means of the tooth systems, the weight of the valve would then cause the tooth systems to mesh with each other with considerable friction and generally in a tight fit.

A slight hampering of the movement of the valve and slight friction while the running face is rolling along the rolling face is achieved according to the invention in particular if the pitch line of the valve tooth system lies flush with or below the running face and/or if the pitch line of the rolling tooth system lies flush with or below the rolling face. "Flush with" should be understood here as indicating that the pitch line in question is co-planar with the face in question. A pitch line lying "below" a face should be understood as indicating that the valve tooth system or rolling tooth system is recessed so deeply in the running part or rolling part respectively that the pitch line in question is situated in the part in question instead of above it.

For a smooth rolling of the running face along the rolling face, it is advantageous according to the invention if the pitch line of the rolling tooth system is disposed so that it is co-planar with the rolling face, and the pitch line of the valve tooth system is disposed so that it is co-planar with the running face. The pitch lines of the respective tooth systems and the current contact line of the rolling face with the running face then intersect each other in one common point.

It is particularly advantageous according to the invention if the rolling tooth system and the valve tooth system are each formed as a theoretical rack profile.

In order to prevent the valve tooth system and roll-

ing tooth system from slipping out of mesh, it is advantageous according to the invention if a stop is provided at the top side of the valve, at the position of the running part.

According to an advantageous embodiment of the invention, it is advantageous if the radius of curvature of the rolling face increases from the outlet side to the inlet side. In this way it is ensured that when the valve assumes a more or less closed position in the case of fairly great pressure differences, the rolling and valve tooth systems mesh with each other over a greater or smaller part of their length respectively, so that when there is a fairly great pressure difference the valve is also secured better against sliding along the rolling part.

In order to prevent unattenuating flapping to and fro of the valve, it is also advantageous according to the invention for eddy-breaking means to be disposed in and/or behind the passage opening.

Furthermore the present invention relates to a self-regulating ventilation grille, comprising a housing having a top wall, a bottom wall, two end panels, a first longitudinal side with inlet, and opposite the first longitudinal side a second longitudinal side with outlet, an essentially plate-shaped valve, being provided in the housing and extending between the end panels, for the purpose of regulating the passage opening for air, which valve at its end facing the longitudinal side with the outlet is provided with a counterweight and rests on a rolling face curved towards the valve, along which face the valve rolls during the regulation of the passage opening.

Such a self-regulating ventilation grille is known from EP-A-0,503,722. This ventilation grille has the disadvantage that the essentially plate-shaped valve flaps to and fro. This flapping to and fro occurs already at a pressure difference of approximately 1.5 Pa. As a result of this flapping to and fro, a sort of "pumping action" which is not damped out occurs. This flapping to and fro of the valve has a negative effect on the regulating characteristic of the output of the ventilation grille. Furthermore, this flapping can cause undesirable noise.

A further object of the present invention is to offer a solution to the last-mentioned disadvantages. This object is achieved according to the invention through the fact that eddy-breaking means are provided in and/or after the passage opening. Eddies are present in and after the passage opening, below the valve. Surprisingly, it has been found that breaking these eddies counteracts flapping of the valve, and can even prevent it completely.

It has been found very advantageous according to the invention if the eddy-breaking means comprise at least one strip or lamella extending between the end panels. Such a strip or lamella, in the form of, for example, an essentially rectangular plate is easy to fit in the ventilation grille. Such a strip is preferably fitted in such a way that when the valve is closed it is in a position essentially at right angles to the plane of the valve. Such a strip can either be immovably fixed to the housing or immovably fixed to the underside of the valve. A combination is also conceivable, in other words, one or more strips immovably fixed to the housing, and one or more strips immovably fixed to the valve.

For good breaking of the eddies, it is very advantageous according to the invention if the edges of a strip or lamella are formed so that they are sharp. For example the edges are sharp if they are not rounded, so that the strip can be of a rectangular cross-section with sharp edges. But it is also possible to provide the strip with a sharp edge by providing a V-shaped longitudinal edge.

It is also advantageous according to the invention if the positioning of the strip(s) or lamella(e) is such that it counteracts direct radiation of sound from the inlet means to the outlet means. When such a self-regulating ventilation grille is installed in, for example, a window of a building, the penetration of sound from the outside into the building is counteracted in a simple way. In order to increase this sound damping, it is very advantageous according to the invention if a strip or lamella comprises sound-damping material. In this case said sound-damping material can be provided as a covering on the strip, but the strip itself can also be made of sound-damping material.

It is also advantageous according to the invention if the ventilation grille comprises a number of strips fitted essentially parallel to each other. Fitting a number of strips parallel to each other in the passage opening after/below the valve produces very good eddy-breaking, and also counteracts the direct inward radiation of sound.

In the case of a self-regulating ventilation grille of the type described above, in which a distribution plate is placed in the inlet, dividing the inlet opening into an upper passage for a pressure-building flow to the top side of the valve and a lower passage for the ventilation flow through the passage opening, and in which the distribution plate comprises a part pointing upwards and slanting into the housing, it is very advantageous if this slanting part is formed in such a way, preferably curved like the arc of a circle, that the upper passage gradually narrows from the outside inwards. This gradual narrowing, which is desirable for the build-tip of pressure above the valve, means that the pressure difference over the grille (i.e. the pressure difference between the longitudinal side with inlet and the longitudinal side with outlet) is utilized as much as possible to make the valve react already when there are small pressure differences, and it means that the occurrence of eddies in the pressure-building flow to the top side of the valve is counteracted. If this slanting part is suitably formed, which will depend, inter alia, on the dimensions of the self-regulating ventilation grille, the response sensitivity of the valve can be very small, for example about 0.5 Pa. Where pressure differences over the grille are small, essentially a pressure-building flow passes through the upper passage, and where there are greater pressure differences, this pressure-building flow, via the opening between the

downward moved end of the valve and the distribution plate, will partly join the ventilation flow and thus contribute to the ventilation.

It is also advantageous according to the invention if the end of the distribution plate situated in the housing lies higher than the end of the valve situated in the inlet opening when the valve is fully open. In this way, when the valve is fully open (as indicated by dashed and dotted lines), a flow between the end of the valve situated at the inlet opening and the distribution plate is counteracted, in such a way that the pressure-building flow is utilized as much as possible for the response sensitivity of the valve. In this way, the occurrence of eddies when the valve is fully open is also counteracted

In an advantageous embodiment of the self-regulating ventilation grille according to the invention, the valve and the rolling face are each provided with teeth, which are disposed in such a way that these teeth mesh with each other when the valve is rolling along the rolling face. Such teeth advantageously prevent the valve from sliding along the rolling face.

The present invention will now be explained in greater detail with reference to a drawing, in which:

Fig. 1 shows a cross-section of a self-regulating ventilation grill according to the invention;
Fig. 2 shows a perspective view of the control unit of a self-regulating ventilation grill according to the invention.
Fig. 3 shows a perspective view of an end panel of the control unit;
Fig. 4 shows a diagrammatic view showing as a detail the meshing teeth of an open valve; and
Fig. 5 shows a diagrammatic view showing as a detail the meshing teeth of a closed valve.

Fig. 1 shows a cross-section of a self-regulating ventilation grille according to the invention. This ventilation grille comprises a housing 30 with a tap wall 1, a bottom wall 2, 32, two end panels (not shown) lying in the plane of the drawing, a first longitudinal side 3 with inlet 4, and a second longitudinal side 5 with an outlet 6, situated opposite the first longitudinal side. The housing 30 contains an essentially plate-shaped valve 7 for regulating the passage opening 8. At its end facing the longitudinal side 5 with the outlet, the valve 7 is provided with a counterweight 9 and rests on a rolling part 10 provided on a profiled part 31, which rolling part has a rolling face curved towards the valve 7. Said rolling part 10 is provided with a rolling face and teeth 45, and the valve 7 is provided at the rolling part with a running part 18 cooperating with the rolling part and provided with a running face and matching teeth. Both teeth are provided in such a way that they mesh with each other when the running face of the valve is rolling along the rolling face. At Fig. 4 and 5 this will be explained more detailed. The valve 7 is movable between two end positions, i.e. a closed position shown by solid lines, and a fully open position shown by dashed and dotted lines. In the fully open position, the passage opening is open over the distance Z.

Eddy-breaking means, in the form of strips (or lamellae) 11 extending between the end panels, are fitted after the passage opening 8 under the valve. The precise positioning and the shape and the number of strips 11 depends, inter alia, on the dimensions of the parts of the ventilation grille. In the example of an embodiment shown, three strips 11 are disposed parallel to each other, in such a way that when the valve 7 is closed, the strips 11 just fall short of touching said valve. Sharp edges are formed at the underside 12 of the strips 11. In the example of an embodiment shown, the strips 11 are secured to the housing, so that their position is fixed. However, it is very conceivable to attach the strips to the underside of the valve 7, so that the strips 11 move with the valve.

If the strips 11 are suitably positioned, they will effectively counteract the occurrence of eddies, as indicated by dashed lines 41, below the valve 7, with the result that the eddies will no longer cause the valve 7 to vibrate (flap to and fro).

As can also be seen from Fig. 1, the positioning of the strips 11 means that direct sound radiation from longitudinal side 3 to longitudinal side 5 is virtually impossible. As a result, the penetration of sound through the ventilation grille is counteracted. This penetration of sound can be counteracted further by making the strips 11 of sound-absorbing material, or covering them with such a material.

The inlet 4 of the ventilation grille consists of an upper passage 14 for a pressure-building flow to the top side of the valve 7 and a lower passage 15 for the ventilation flow through the passage opening 8 to the outlet 6. The outlet 6 preferably consists of a grille 6 serving as a screen. Said grille 6 is preferably fixed by means of snap connections 21 and 22 to the bottom wall 2 and the top wall 1 respectively of the housing 30.

The top wall 1 ends at the longitudinal side 3 with the inlet in a downward slanting rain cap 20.

The shape of the inlet 4 is extremely important for good functioning of the self-regulating ventilation grille. On the one hand, the incoming air flow has to be divided into a pressure-building flow to the top side of the valve 7 and a ventilation flow through the passage opening to the outlet 6. For this purpose, provision is made for a distribution plate 13 extending between the end faces, which divides the inlet opening into an upper passage 14 for the pressure-building air flow and a lower passage 15 for the ventilation flow. In the case of small pressure differences over the grille, in the main a pressure-building flow passes through the upper passage 14, but at greater pressure differences, said pressure-building flow will, by way of the opening between the downward moving end 27 of the valve 7 and the distribution plate 16, partially join the ventilation flow and thus contribute to the ventilation. In the case of an air flow pushed up-

wards along the walls of, for example, a block of flats, in order to fill the chamber 25 above the valve 7 sufficiently, rain cap 20 projects over a distance X beyond the distribution plate 13. The part 26 projecting from the bottom wall 2 onwards projects just far enough to ensure that during such an upward air flow the flow resistance of the ventilation flow is sufficient to prevent the latter from flowing directly against the underside of valve 7 and making said ventilation flow slightly diffuse.

On the other hand, for a good pressure-building effect in chamber 25 above the valve 7, it is important for the upper passage 14 to narrow. For good functioning of the ventilation grille, this narrowing must be gradual, in such a way that, inter alia, the total pressure difference over the grille is utilized as much as possible to set the valve in motion, and the occurrence of eddies in the chamber 25 above the valve 7 is counteracted. Such eddies could cause a vibrating movement in the valve which is difficult or impossible to damp out. It is also important that the slanting part 16 of distribution plate 13 should end at least slightly higher than the end 27 when the valve 7 is fully open, as indicated by Y. The gradual narrowing of the upper passage is advantageously caused by making the slanting part 16 of the distribution valve 13 curved in the shape of an arc of a circle, as can be seen in Fig. 1.

In order to be able to close the ventilation grille fully by hand, a rod 24 is provided between the end panels, which rod can be moved downwards by means of an operating mechanism (not shown), in such a way that it pushes the valve 7 shut.

The passage opening 8, which determines the ventilation, can be reduced by means of a flexible element 23. Said flexible element 23, which is fixed to the bottom wall 2 at 28, can be bent or pivoted upwards in the direction of arrow A by means of a mechanism not shown. The passage opening 8 can be, for example, halved in this way.

Fixing means 19 are provided on the top wall 1 and bottom wall 2, by means of which the ventilation grille can be fixed in, for example, a window frame.

For the mode of operation of the ventilation grille described here, you are referred to EP-A-503,722. The ventilation grille according to the present invention can operate in, for example, a pressure difference regulating range of 0-20 Pa, with a response sensitivity of only 0.5 Pa, without the valve going into a vibration which cannot be damped out. In the case of a ventilation grille according to EP-A-503,722 a pressure difference of 1.5 Pa already leads to undesirable vibrations of the valve.

It is pointed out that, as can be seen from Fig. 1, the crosssection shapes of the profiles for the top wall 1 and the bottom wall 2 of the housing are the same. This means that one mould will be sufficient for the extrusion of such top and bottom walls.

According to a particularly advantageous embodiment, the ventilation grille according to the invention is made up of two parts. The first part comprises the housing with, inter alia, top wall 1, to which rain cap 20 is fixed, bottom wall 2, snap-on screen-type longitudinal side 5, and distribution plate 13. As shown in Fig. 2, the second part comprises the control unit with, inter alia. valve 7 (omitted in Fig. 2), operating mechanism 24,40,41,53, top profile 31, and bottom profile 32. Top profile 31 and bottom profile 32 are in this case connected to each other by means of the end panels 42,43. The top wall 1 and bottom wall 2 may be connected to each other in a similar way if desired, by means of end panels (not shown). In the case of such a ventilation grille the control unit can be placed as one assembled unit in the housing through the outlet side, following which the screen 6 (Fig. 1) can be snapped onto the (outer) housing. In this case, the housing can be, for example, 3 m long (viewed at right angles to the surface of drawing in Fig. 1), and viewed in the direction 1 the control unit can be 0.55 m. In this way it is possible to design, for example, a 0.55 m long control unit for the ventilation requirements for, for example, two persons, which unit can subsequently be placed in a housing with a length depending on the width of the window frame (for example, 3 metres). The remaining part of the housing is armoured in this case, in such a way that the passage between inlet side and outlet side is shut off, and the ventilation thus takes place only by way of the control unit. It the ventilation in the room to be ventilated has to be adapted to more than two persons, it is, of course, possible to place two or more control units, designed for two persons, in one housing. Where there is an odd number of persons, the flexible element 23 of one of the control units can then be bent upwards, with the result that the maximum width of passage is halved. Moreover, a separate control unit can be designed for any desired number of persons. If a facility for separate installation is not necessary for the control unit, it is, for example, possible to leave out bottom profile 32, and the end faces of the housing, for example, can serve as the end panels.

As can be seen in Fig. 2, the eddy-breaking means 11 are disposed in the control unit by means of snap-on supports 44. As shown in Fig. 3 for end panel 42, each end panel 42, 43 is provided with a rolling part with a rolling face 46 and a rolling tooth system 45. The rolling face 46 is curved in a convex shape towards the valve (not shown), in such a way that the radius of curvature of the rolling face 46 increases from the outlet side 5 to the inlet side 4.

Figs. 4 and 5 show diagrammatically the rolling of the valve 7 over the rolling part. In Fig. 4 the valve 7 is situated in a horizontal, fully open position, and in Fig. 5 in a slanting position shutting off the passage opening. At the position of the rolling part 45, 46, the valve 7 is provided with a running part with a running face 47 and a valve tooth system 48. The running face 47 in this case is a part of the underside of the valve 7. The valve tooth system 48 is formed in an attachment piece 49 fixed to the valve. The running face 47 and the valve tooth sys-

tem 48 are straight in the figures, but a convex or a hollow shape is also conceivable.

The tooth systems 45 and 48 are disposed partially recessed relative to the rolling face 46 and the running face 47 respectively, in such a way that the pitch line of said tooth systems 45 and 48 is coplanar with the rolling face 46 and the running face 47 respectively. The current contact line extending in direction 1 between the rolling face 46 and the running face 47 then always intersects the current contact point of the two pitch circles. Good rolling behaviour is obtained in this way.

The tooth systems 45 and 48 are obtainable in a simple way by taking a theoretical rack profile and placing the pitch line thereof so that it is co-planar with the rolling face or the running face respectively.

The stop 50 shown in Figs. 3, 4 and 5 is provided with an essentially horizontal stop face 52 on the underside. This stop 50, which is preferably detachable for assembly purposes, prevents the tooth systems 45 and 48 from slipping out of mesh, which could result in the valve sliding relative to the rolling part. The slope of the slanting stop face preferably corresponds to the slope of the valve at the position of the stop when the valve is fully closed. The slanting stop face 52 and horizontal stop face 51 make it possible to fit the stop close to the valve, without impeding the opening/closing movement thereof.

Claims

1. Self-regulating ventilation grille, comprising a housing (30) having a top wall (1), a bottom wall (2), two end panels, a first longitudinal side (3) with an inlet (4), and opposite the first longitudinal side a second longitudinal side (5) with an outlet (6), an essentially plate-shaped valve (7) being provided in the housing and extending between the end panels, for the purpose of regulating a passage opening (8) for the ventilation of air from the inlet to the outlet, which valve at its end nearest the longitudinal side with the outlet means is provided with a counterweight (9) and rests with a running part on a rolling part (10) curved towards the valve, along which rolling part the valve rolls during the regulation of the passage opening, **characterized in that** the running part of the valve (7) comprises a running face (47) and a valve tooth system (48), in that the rolling part comprises a rolling face (46) and a rolling tooth system (45), and in that the rolling tooth system (45) and the valve tooth system (48) are disposed in such a way that they mesh with each other when the running face (47) is rolling over the rolling face (46).

2. Self-regulating ventilation grille according to Claim 1, **characterized in that** the valve tooth system (48) and rolling tooth system (45) are formed and disposed in such a way that the teeth of one tooth system mesh with some play in the tooth spaces of the other tooth system.

3. Self-regulating ventilation grille according to Claim 1 or 2, **characterized in that** the pitch line of the valve tooth system (48) extends parallel to the running face (47).

4. Self-regulating ventilation grille according to one of the preceding claims, **characterized in that** the pitch line of the rolling tooth system (45) preferably extends parallel to the rolling face (46).

5. Self-regulating ventilation grille according to one of the preceding claims, **characterized in that** the pitch line of the rolling tooth system (45) is disposed so that it is co-planar with the rolling face (46), and in that the pitch line of the valve tooth system (48) is disposed so that it is co-planar with the running face (47).

6. Self-regulating ventilation grille according to one of the preceding claims, **characterized in that** the rolling tooth system (45) and the valve tooth system (48) are each formed as a theoretical rack profile.

7. Self-regulating ventilation grille according to one of the preceding claims, **characterized in that** at the top side of the valve, at the position of the running part, a stop (50) is provided, which stop prevents the valve tooth system (48) and rolling tooth system (45) from slipping out of mesh.

8. Self-regulating ventilation grille according to Claim 7, **characterized in that** the stop (50) has a horizontal stop face (51) and a slanting stop face (52) situated at the outlet side.

9. Self-regulating ventilation grille according to one of the preceding claims, **characterized in that** the radius of curvature of the rolling face (46) increases from the outlet side (5) to the inlet side (4).

10. Self-regulating ventilation grille according to one of the preceding claims, **characterized in that** eddy-breaking means (11) are disposed in and/or behind the passage opening (8).

11. Self-regulating ventilation grille according to one of the preceding claims, wherein the inlet (4) consists of an upper passage (14) for a pressure building flow to the top side of the valve (7) and a lower passage (15) for the ventilation flow through the passage opening (8) to the outlet (6).

Patentansprüche

1. Selbstregelnder Lüftungsrost, der ein Gehäuse (30) mit einer oberen Wand (1), einer unteren Wand (2), zwei Endplatten, einer ersten Längsseite (3) mit einem Einlaß (4) und einer zweiten Längsseite (5) mit einem Auslaß (6) gegenüber der ersten Längsseite umfaßt, wobei eine im wesentlichen plattenförmige Klappe (7) in dem Gehäuse vorhanden ist und sich zwischen den Endplatten erstreckt, um eine Durchlaßöffnung (8) für den Durchzug von Luft von dem Einlaß zu dem Auslaß zu regulieren, wobei die Klappe an ihrem am nächsten an der Längsseite mit der Auslaßeinrichtung liegenden Ende mit einem Gegengewicht (9) versehen ist und mit einem Laufteil auf einem Rollteil (10) aufliegt, das auf die Klappe zu gekrümmt ist, wobei die Klappe bei der Regulierung der Durchlaßöffnung auf dem Rollteil rollt, **dadurch gekennzeichnet**, daß das Laufteil der Klappe (7) eine Lauffläche (47) und ein Klappenzahnsystem (48) umfaßt, daß das Rollteil eine Rollfläche (46) und ein Rollzahnsystem (45) umfaßt, und daß das Rollzahnsystem (45) und das Klappenzahnsystem (48) so angeordnet sind, daß sie miteinander in Eingriff kommen, wenn die Lauffläche (47) über die Rollfläche (46) rollt.

2. Selbstregelnder Lüftungsrost nach Anspruch 1, **dadurch gekennzeichnet**, daß das Klappenzahnsystem (48) und das Rollzahnsystem (45) so geformt und angeordnet sind, daß die Zähne eines Zahnsystems mit einem bestimmten Spiel in die Zahnlükken des anderen Zahnsystems eingreifen.

3. Selbstregelnder Lüftungsrost nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß die Wälzlinie des Klappenzahnsystems (48) parallel zu der Lauffläche (47) verläuft.

4. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, daß die Wälzlinie des Rollzahnsystems (45) vorzugsweise parallel zu der Rollfläche (46) verläuft.

5. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, daß die Wälzlinie des Rollzahnsystems (45) so angeordnet ist, daß sie koplanar zu der Rollfläche (46) ist, und daß die Wälzlinie des Klappenzahnsystems (48) so angeordnet ist, daß sie koplanar zu der Lauffläche (47) ist.

6. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, daß das Rollzahnsystem (45) und das Klappenzahnsystem (48) jeweils als Sollzahnstangenprofil ausgebildet sind.

7. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, daß an der Oberseite der Klappe an der Position des Laufteils ein Anschlag (50) vorhanden ist, wobei der Anschlag verhindert, daß das Klappenzahnsystem (48) und das Rollzahnsystem (45) außer Eingriff rutschen.

8. Selbstregelnder Lüftungsrost nach Anspruch 7, **dadurch gekennzeichnet**, daß der Anschlag (50) eine horizontale Anschlagfläche (51) und eine abgeschrägte Anschlagfläche (52) hat, die an der Auslaßseite angeordnet ist.

9. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, daß der Krümmungsradius der Rollfläche (46) von der Auslaßseite (5) zu der Einlaßseite (4) zunimmt.

10. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, **dadurch gekennzeichnet**, daß Wirbelbrecheinrichtungen (11) in und/oder hinter der Durchlaßöffnung (8) angeordnet sind.

11. Selbstregelnder Lüftungsrost nach einem der vorangehenden Ansprüche, wobei der Einlaß (4) aus einem oberen Durchlaß (14) für einen druckaufbauenden Strom zur Oberseite der Klappe (7) und einem unteren Durchlaß (15) für den Durchzugstrom durch die Durchlaßöffnung (8) zu dem Auslaß (6) besteht.

Revendications

1. Grille de ventilation à autorégulation, comprenant un boîtier (30) comportant une paroi supérieure (1), une paroi inférieure (2), deux panneaux d'extrémité, un premier côté longitudinal (3) avec une entrée (4), et, à l'opposé du premier côté longitudinal, un deuxième côté longitudinal (5) avec une sortie (6), un clapet essentiellement en forme de plaque (7) étant disposé dans le boîtier et s'étendant entre les panneaux d'extrémité, dans le but de réguler une ouverture de passage (8) pour la ventilation d'air de l'entrée à la sortie, ce clapet, à son extrémité la plus proche du côté longitudinal avec les moyens de sortie, comportant un contrepoids (9) et reposant avec une partie circulante sur une partie de roulement (10) incurvée en direction du clapet, partie de roulement le long de laquelle le clapet roule durant la régulation de l'ouverture de passage, caractérisée en ce que la partie circulante du clapet (7) comprend une face circulante (47) et un système de dents de clapet (48), en ce que la partie de roulement comprend une face de roulement (46) et un système de dents de roulement (45) et en ce que

le système de dents de roulement (45) et le système de dents de clapet (48) sont disposés de telle sorte qu'ils s'engrènent l'un avec l'autre lorsque la face circulante (47) roule sur la face de roulement (46).

2. Grille de ventilation à autorégulation selon la revendication 1, caractérisée en ce que le système de dents de clapet (48) et le système de dents de roulement (45) sont formés et disposés de telle sorte que les dents d'un système de dents s'engrènent avec un certain jeu dans les espaces interdentaires de l'autre système de dents.

3. Grille de ventilation à autorégulation selon la revendication 1 ou 2, caractérisée en ce que la ligne primitive du système de dents de clapet (48) s'étend parallèlement à la face circulante (47).

4. Grille de ventilation à autorégulation selon l'une des revendications précédentes, caractérisée en ce que la ligne primitive du système de dents de roulement (45) s'étend de préférence parallèlement à la face de roulement (46).

5. Grille de ventilation à autorégulation selon l'une des revendications précédentes, caractérisée en ce que la ligne primitive du système de dents de roulement (45) est disposée de telle sorte qu'elle soit coplanaire à la face de roulement (46) et en ce que la ligne primitive du système de dents de clapet (48) est disposée de telle sorte qu'elle soit coplanaire à la face circulante (47).

6. Grille de ventilation à autorégulation selon l'une des revendications précédentes, caractérisée en ce que le système de dents de roulement (45) et le système de dents de clapet (48) sont chacun formés avec un profil de crémaillère théorique.

7. Grille de ventilation à autorégulation selon l'une des revendications précédentes, caractérisée en ce que, du côté supérieur de clapet, dans la position de la partie circulante, une butée (50) est présente, cette butée empêchant le système de dents de clapet (48) et le système de dents de roulement (45) de se désengrener.

8. Grille de ventilation à autorégulation selon la revendication 7, caractérisée en ce que la butée (50) comporte une face de butée horizontale (51) et une face de butée inclinée (52) située du côté de la sortie.

9. Grille de ventilation à autorégulation selon l'une des revendications précédentes, caractérisée en ce que le rayon de courbure de la face de roulement (46) augmente du côté sortie (5) au côté entrée (4).

10. Grille de ventilation à autorégulation selon l'une des revendications précédentes, caractérisée en ce que des moyens de rupture de tourbillon (11) sont disposés dans et/ou derrière l'ouverture de passage (8).

11. Grille de ventilation à autorégulation selon l'une des revendications précédentes, dans laquelle l'entrée (4) se compose d'un passage supérieur (14) pour un écoulement d'accumulation de pression vers le côté supérieur du clapet (7) et d'un passage inférieur (15) pour l'écoulement de ventilation à travers l'ouverture de passage (8) vers la sortie (6).

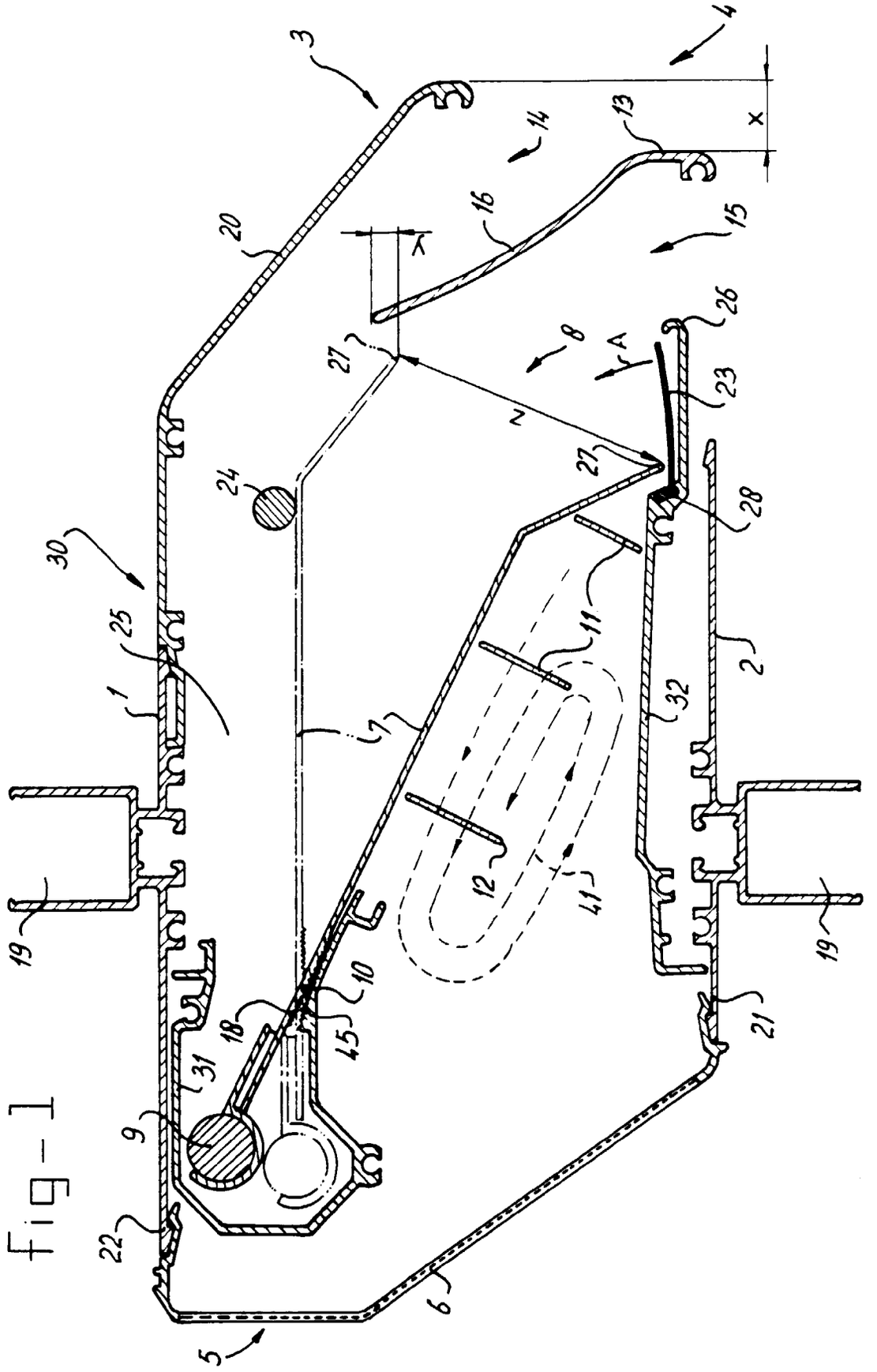
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fig-1

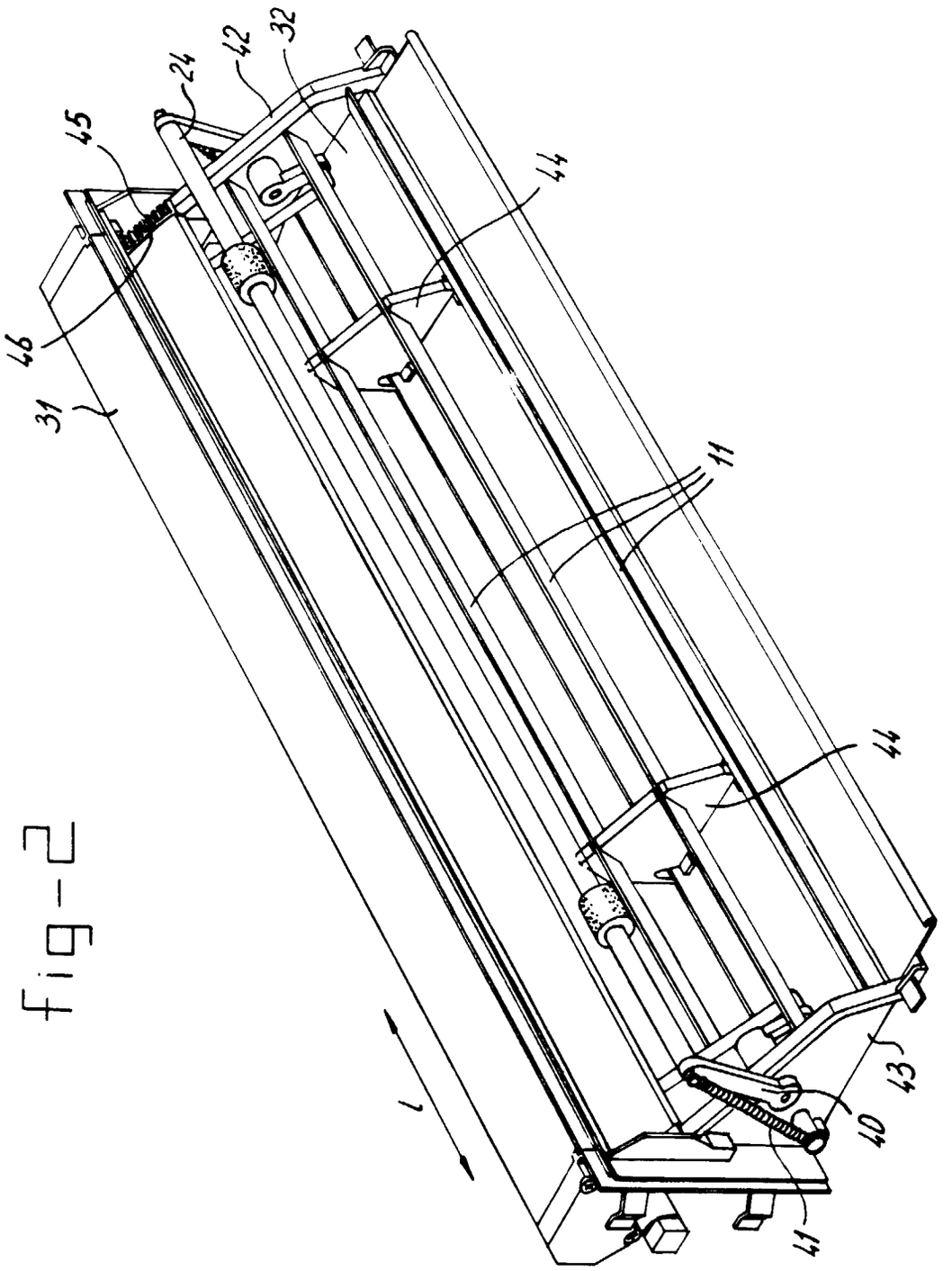

fig-2

Fig-3

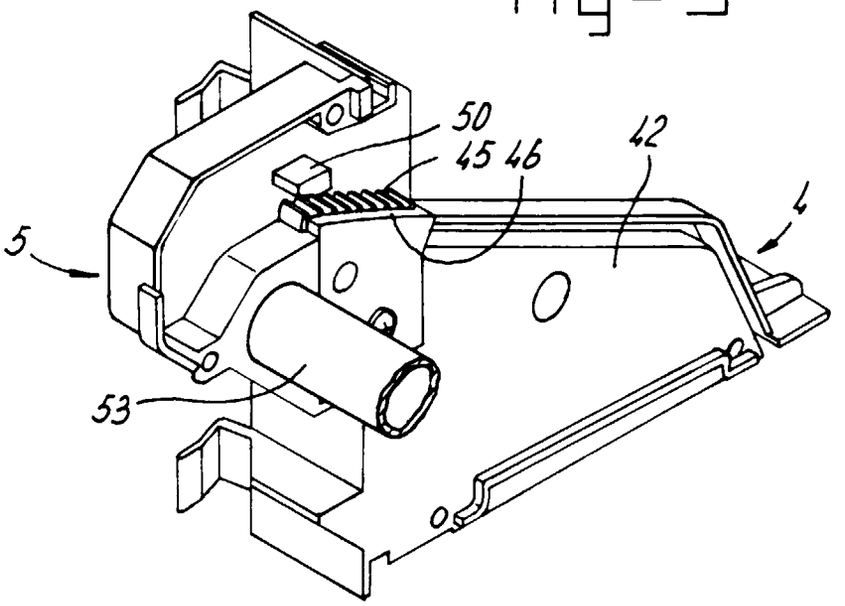

Fig-4

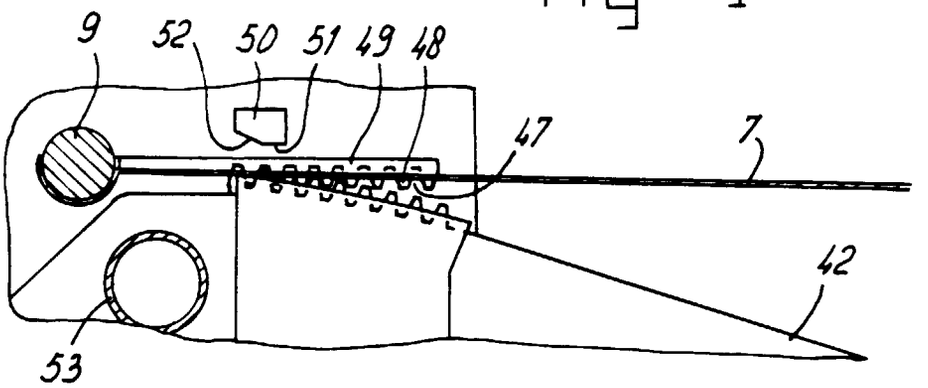

Fig-5